NRL Report 7929

A Program to Plot a Track and Bathymetry or Magnetic Profile on a Polar Stereographic Projection

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

A program has been written for plotting a track and the superimposed bathymetry or magnetic profile on a polar stereographic projection. This profile series is plotted perpendicular to the track, using uncorrected fathoms or meters for bathymetry and residual magnetic intensity for magnetics.

The program was written in Fortran IV for use on a CDC 3800 Computer; however, the program can be converted to run on other systems with little difficulty.

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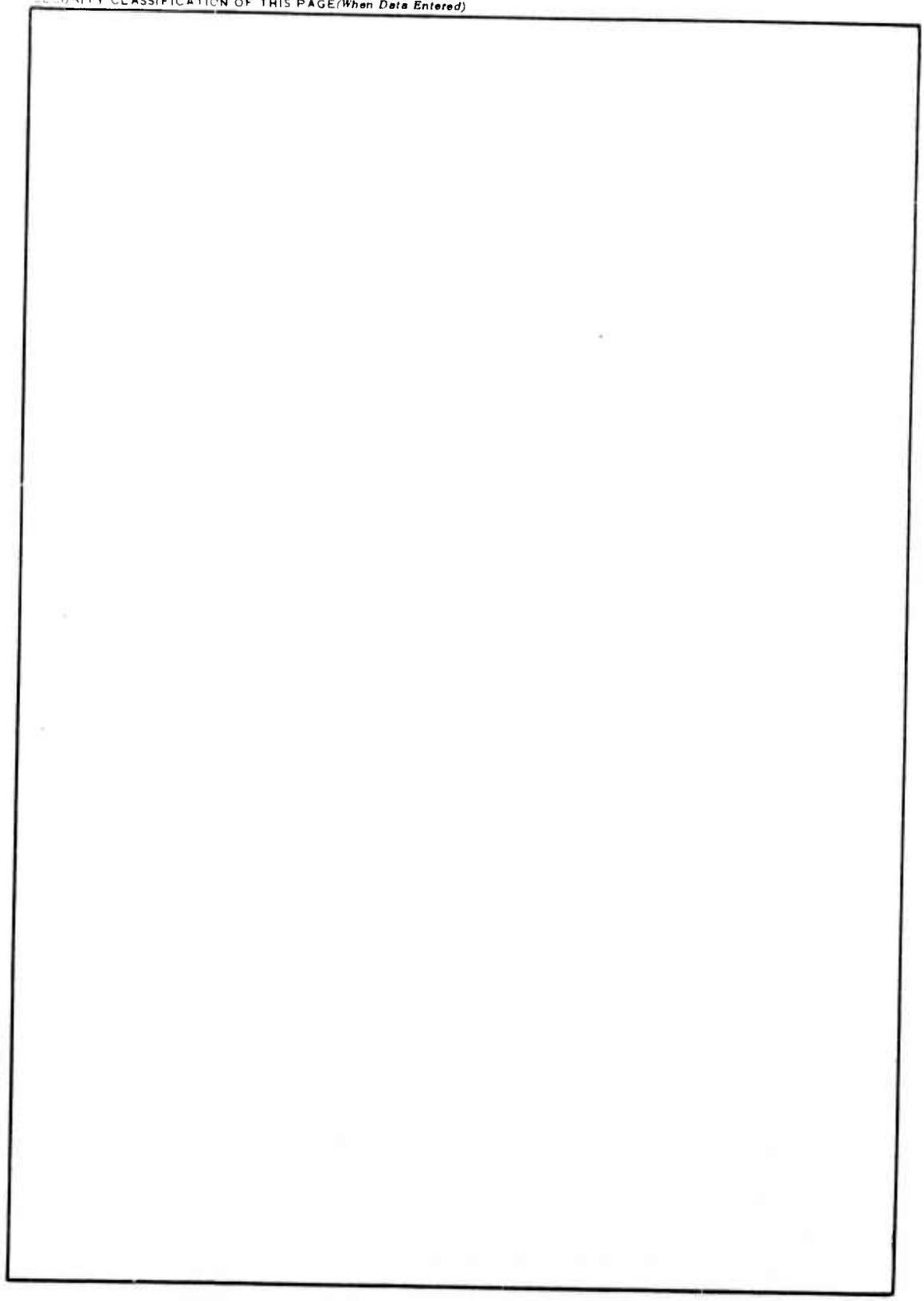


CONTENTS

A PROGRAM TO PLOT A TRACK AND BATHYMETRY OR MAGNETIC PROFILE ON A POLAR STEREOGRAPHIC PROJECTION

1.0 IDENTIFICATION

1.1 Title
Program to Plot a Track and Bathymetry or Magnetic Profile on a Polar Stereographic Projection.

1.2 Identification Name
Track.

1.3 Classification Code
None.

1.4 RCC Identification Number
None.

1.5 Entry Points
TRACK.

1.6 Programming Language
Language: CDC 3600/3800 Fortran.
Routine Type: Program.
Operating System: Drum Scope 2.1.

1.7 Computer and Configuration
CDC 3800.

1.8 Contributor or Programmer
Marilyn L. Blodgett, Code 8176MB, Long Range Propagation Section, written for the Environmental Sciences Section, Acoustics Division.

1.9 Contributing Organization
NRL - Naval Research Laboratory, Washington, D.C. 20375.

1.10 Program Availability
If supplied with a magnetic tape, the Environmental Sciences Section, Acoustics Division, will make a copy of this program.

1.11 Verification
This program has been used and tested by the Environmental Sciences Section, Acoustics Division, for several months.

1.12 Date
April 1976

Manuscript submitted September 3, 1975.

2.0 PURPOSE

2.1 Description of the Routine

This program reads the data collected by an oceanographic or geophysical experiment from a magnetic tape and plots the track and bathymetric or magnetic value perpendicular to the track as a profile. We use the format recommended by the National Research Council of the National Academy of Sciences with one slight modification for the input data tape. There is one logical record (of 80 characters) for each data point. The different types of data (bathymetry and magnetics) are separated by an end-of-file mark with a double end-of-file mark at the end of all the data.

Before the program reads this input tape, it reads two cards. The first card defines the actual data format on the input tape (the format varies for the two types of data). The second card specifies the number of files to be skipped over on the first input tape, the physical height of the map to be drawn, the actual latitude and longitude values to be included on the grid, the dates of the data on the first input tape to be considered for plotting, the actual values to be plotted, and the units per inch for plotting the bathymetric or magnetic profiles along the track.

With all the required parameters defined, the program starts to read the input tape one record at a time. Each record is checked to see that the fix falls on the defined grid and that it was taken on or between the two specified dates. Only those points which meet both requirements are stored in core. The program continues reading the first input tape until it reads an end-of-file mark or a fix taken after the last specified date. If there are additional input tapes, the program reads them in a similar manner. The beginning and end dates for each new input tape are contained on an Extra card. A maximum of four input tapes can be used. When all the input tapes have been read, the program prepares to plot the track and the specified values, either bathymetry or magnetics.

The track is plotted on a polar stereographic projection which is drawn exactly to scale. The grid may be blown up to any reasonable size. The largest grid we have defined is 1 degree of latitude equals 20 inches. The number of degrees of longitude included in the grid will depend on the scale of the entire grid and the specific area of interest. In the case of 1 degree of latitude equals 20 inches, no more than 10 degrees of longitude can be included in the grid. Since the projection is drawn exactly to scale, a mosaic can later be built of the entire area. Depending on the type of data read, the profiling values will be either uncorrected fathoms, uncorrected meters, or residual magnetic intensity.

2.1.1 Bathymetry Data

The program reads the year, date (month and day), hour, minute, latitude, longitude, and uncorrected fathoms from the input tape according to the specified format. The southern latitudes and the western longitudes are

preceded by a negative sign. The program can convert uncorrected fathoms to uncorrected meters. The track is plotted in a continuous straight line, and the profiling series is either uncorrected fathoms or meters multiplied by -1 to drop it below the track.

2.1.2 Magnetic Data

The program reads the year, date (month and day), hour, minute, latitude, longitude, and residual magnetic intensity from the input tape according to the specified format. The southern latitudes and the western longitudes are preceded by a negative sign. The track is plotted in a continuous straight line, and the profiling series is residual magnetic intensity.

2.2 Problem Background

Program Track was written so that the researcher can build a profile, either magnetic or bathymetric, along the track from which the data were taken. Presenting data in this manner will show bathymetric or magnetic trends in relation to the geographic area.

3.0 USAGE

3.1 Calling Sequence or Operation Procedure

Not applicable.

3.2 Arguments, Parameters, and/or Initial Conditions

Not applicable.

3.3 Space Required (Decimal and Octal)

3.3.1 Unique Storage

5127 octal (2647 decimal) locations exclusive of system library functions.

3.3.2 Common Blocks

Blank common
/1/, /3/, /5/, /7/, /8/, /9/, /10/.

3.3.3 Temporary Storage

None.

3.4 Messages and Instructions to the Operator

None.

3.5 Error Return, Messages, and Codes

None.

3.6 Informative Messages to the User

None.

3.7 Input

The actual format of the data on the input tape, the map parameters, and the command words are read in via input cards. The track and the data to be profiled are read in via magnetic tape on logical units 15 through 18. Apendix A presents samples of our data formats on the input tape. Appendix B is a complete description of the input deck setup.

3.8 Output

The program prints on the standard printer (logical unit 61) the data format, chart parameters, number of data points read in, and the number of data points plotted on the map for both the track and the profiled data. Appendix C presents sample profiles, and Appendix D presents a sample output listing. The program writes the plotting instructions on a magnetic tape (logical unit 40).

3.9 Formats

Appendix B describes the program deck structure.

3.10 External Routines and Symbols

ATAN2, SQRTF, SINF, COSF, ATANF, SPACE00, BACKFILE, SKIPFILE, PLOTS, NUMBER, STOPPLOT, PLOT, SYMBOL.

3.11 Timing

The time required depends on the size of the grid and the number of data read and plotted.

3.12 Accuracy

The grid is reproduced exactly to scale.

3.13 Cautions to Users

None.

3.14 Program Deck Structure

Appendix B describes the program deck structure.

3.15 References - Literature

R.L. Parker, "The UCSD Hypermap Programs," University of California, San Diego.

M.J. Kertyzak and J.D. Phillips, "GRENHY," Woods Hole Oceanographic Institute, Woods Hole, Massachusetts.

M.L. Blodgett and J.V. Massingill, "A Program for Storing Oceanographic Data on Magnetic Tape," NRL Report 7861, March 1975.

4.0 METHOD OR ALGORITHM

Not Applicable.

5.0 FLOW CHART AND/OR SOURCE LANGUAGE LISTING

The flow chart and listing are given in Appendixes E and F.

6.0 COMPARISON

No other known programs are available for comparison.

7.0 TEST METHOD AND RESULTS

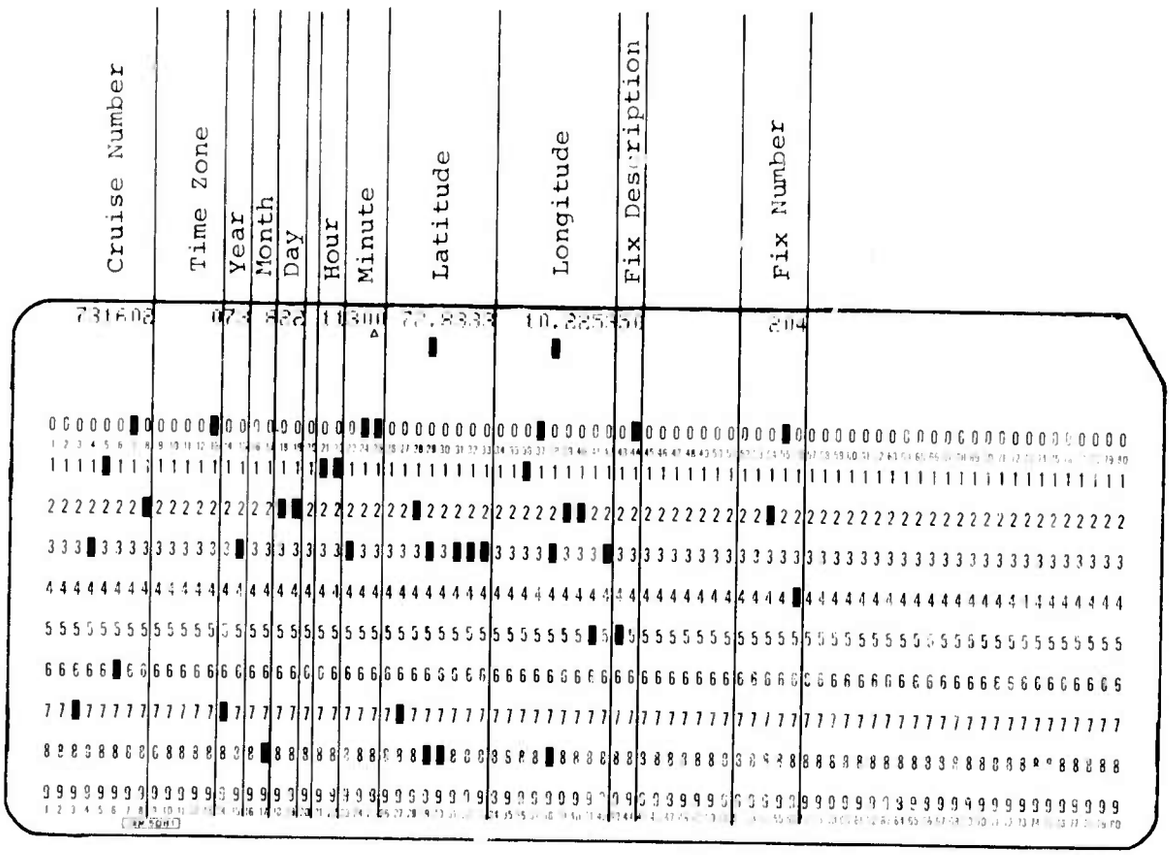
The program has been used and tested successfully on a Calcomp plotter.

8.0 REMARKS

None.

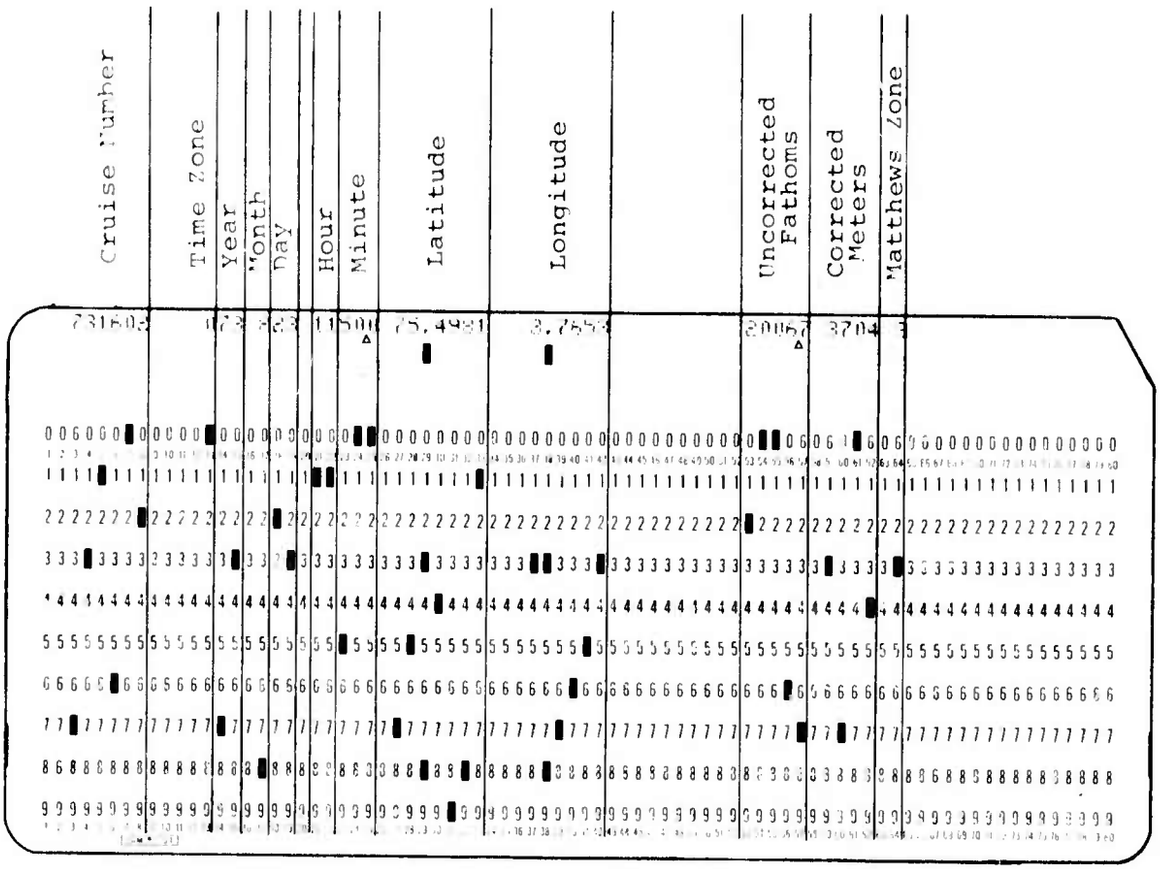
APPENDIX A
Sample Input Data Record

NAVIGATION RECORD



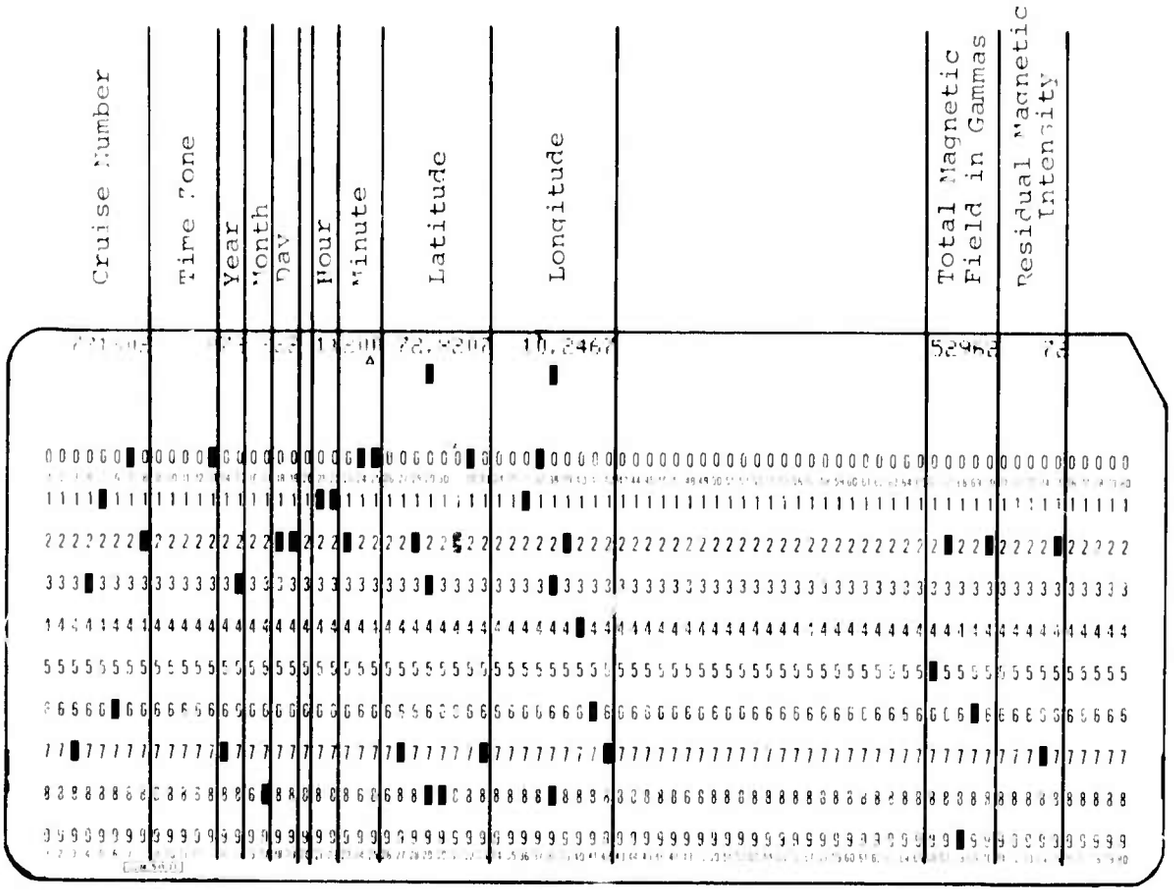
[Δ]Implies a decimal point.

BATHYMETRY RECORD



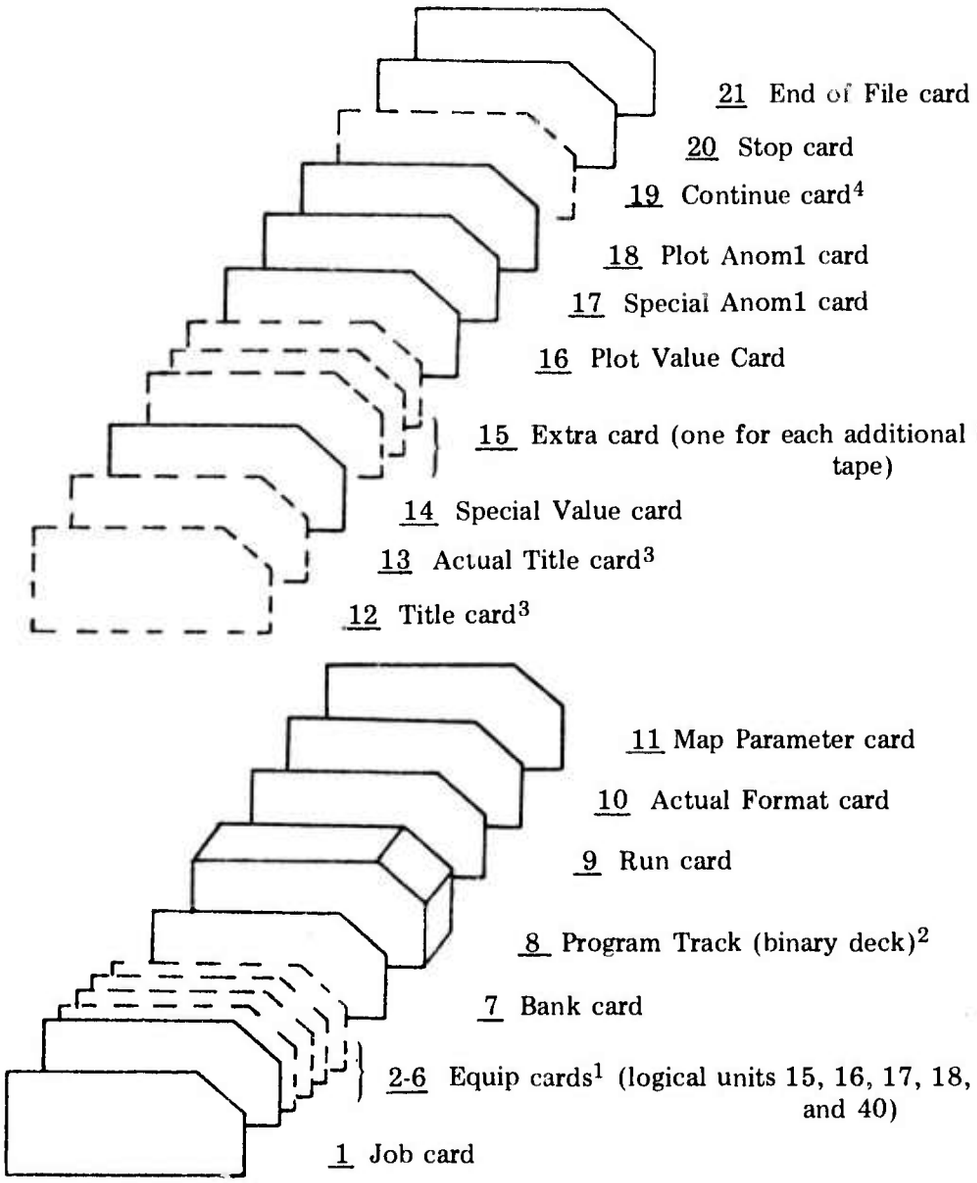
[Δ]Implies a decimal point.

MAGNETIC RECORD



[Δ]Implies a decimal point.

APPENDIX B
Deck Assembly for Program Track



[1]The program uses scratch tapes on logical units 20 and 05, but no Equip cards are required, since the drum is used.

[2]If the Fortran source deck is used instead of the binary deck, a Fortran card is required after the Bank card. In addition, a Scope card and Load card must follow the source deck.

[3]These two cards are not required by the program; both cards may be present or both omitted.

[4]This card is used only if another plot is desired. It is to be followed by a second set of input cards (10-18).

Number	Card Title	Column Number	Description
1	Job	1-21	7/9 JOB, Charge No., ID No., time. See page 2-2 of the 3600/3800 Computer System Drum Scope Manual.
2-6	Equip	1-18	7/9 EQUIP, 40=**, WO, LO 7/9 EQUIP, 15=**, RO, HI 7/9 EQUIP, 16=**, RO, HI 7/9 EQUIP, 17=**, RO, HI 7/9 EQUIP, 18=**, RO, HI 40, 15, 16, 17, 18 = logical unit numbers. RO = read only. WO = write only. LO = low density. HI = high density.
7	Bank		-/0/7/9 BANK, (0), /1/ See page 7-17 of the 3600/3800 Computer System Drum Scope Manual.
8	Program	Deck of Track	This is the main program with associated subroutines. If the Fortran source deck is used instead of the binary deck, a Fortran card is required after the Bank card. The Fortran card reads 7/9 FTN, L, R, X. In addition a Scope card with SCOPE starting in column 10 and a Load card must follow the source deck.
9	Run	1-13	7/9 RUN, T, P, R, M, D T = time limit in minutes. P = Maximum number of print or write operations. R, M, D may be left blank. See page 2-15 of the 3600/3800 Computer System Drum Scope Manual.
10	Actual Format	1-?	(13X, I2, I4, 1XI2, F3.1, F8.4, F9.4, 28XF5, 5X) This format should be replaced by the desired input format. The format must be enclosed in parentheses and left-justified. Via this format the program reads the year, date, hour, minute, latitude, longitude, and value for the profiling series (uncorrected fathoms for bathymetry and residual magnetic intensity for magnetics).

Number	Card Title	Column Number	Description
			The formats for reading the two data types on our input tapes are: • Bathymetry (13X I2, I4, 1X I2, F3.1, F8.4, F9.4, 10XF5.1) • Magnetics (13X I2, I4, 1X I2, F3.1, F8.4, F9.4, 28XF5).
11	Map Parameter	2	-1, 0, or 1 -1 = multiply uncorrected fathoms by -1 to drop the value series below the track. 0 = plot the anomaly value as read from the input tape. This parameter is used to plot the residual magnetic intensity. 1 = convert uncorrected fathoms to uncorrected meters and multiply by -1 to drop the profiling series below the track.
		4	0 or 1 0 = plot only the track. 1 = plot both the track and the profiling series.
		6	0 or 1 0 = plot all data which falls on the defined grid. 1 = plot all data which falls between the southern degree of latitude plus one degree and the northern degree of latitude.
		9-10	2 Number of degrees between latitude lines drawn on the grid.
		11-12	1 Number of degrees between the longitude lines drawn on the grid.

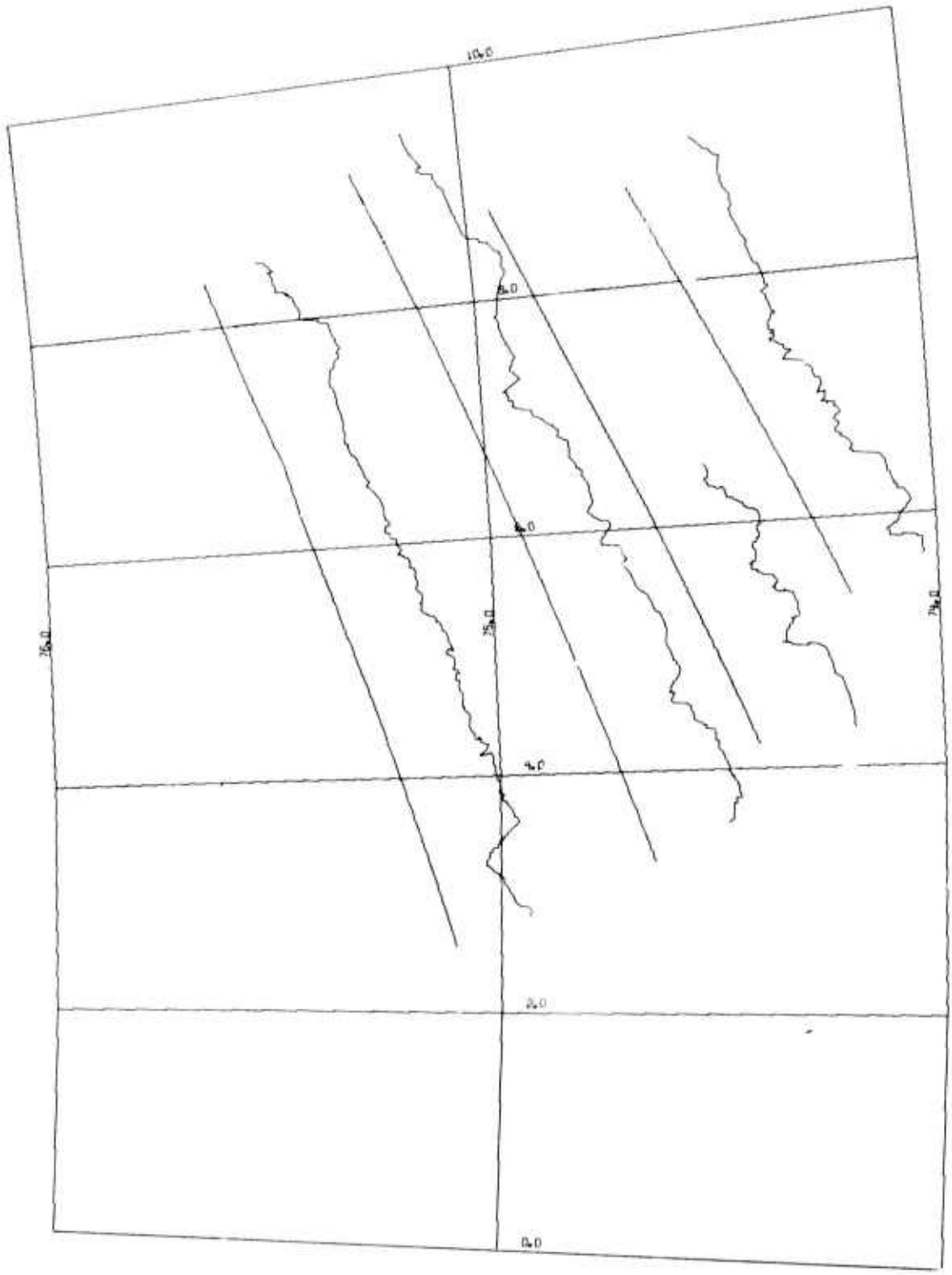
Number	Card Title	Column Number	Description
		13-14	0, 1, or 2 Number of files to be skipped over our input tape. There are a maximum of three files on our Geodata tapes.
		15-22	1000.00 Units per inch for plotting the anomaly along the track. The maximum is 2000 gammas per inch on the map surface. A value of 1000 means that a profiling value of 1000 gammas would be plotted 1 inch above the track. The remainder of the anomaly data would be scaled accordingly.
		23-30	20.0 Physical height of the chart to be drawn. To obtain this figure, you must measure the actual physical height from an existing map.
		31-38	82.5 The degree of latitude at the base of the chart (the southernmost latitude). This value may be either a whole or a half degree. (Southern latitudes are preceded by a minus sign.)
		39-46	84.5 The northernmost degree of latitude. The difference between the degrees of latitude should be an integer.
		47-54	-15.0 The westernmost degree of longitude. (Western longitudes are preceded by a minus sign.)
		55-62	05.0 The easternmost degree of longitude.
		64	1, 2, 3, or 4 Number of input tapes, with the maximum being four tapes.

Number	Card Title	Column Number	Description
		65-72	02251600 The date and time of the first data point to be plotted from the first input tape. Columns 65-66 = month, 67-68 = day, 69-70 = hours, and 71-72 = minutes.
		73-80	02280830 The date and time of the last data point to be plotted from the first input tape. All data taken on and between the dates and times of the first and last data points will be plotted if they fall within the defined chart.
12	Title	1-5	TITLE This command allows the user to label the chart. This is a non-obligatory card.
13	Actual Title	1-80	ARCTIC BASIN The appropriate title may be punched anywhere in the 80 columns. This is a nonobligatory card.
14	Special Values	1-14	SPECIAL VALUES This command allows the user to associate the name. Values with the series of data points read from the input tape(s). The program will store only those data points which fall on the defined chart and which were taken on or between the two dates specified.
15	Extra	1-4	0, 1, or 2 Number of files to be skipped over on the second input tape. There must be an Extra card for each additional input tape. Since there is a maximum of four input tapes, the maximum number of Extra cards is three.

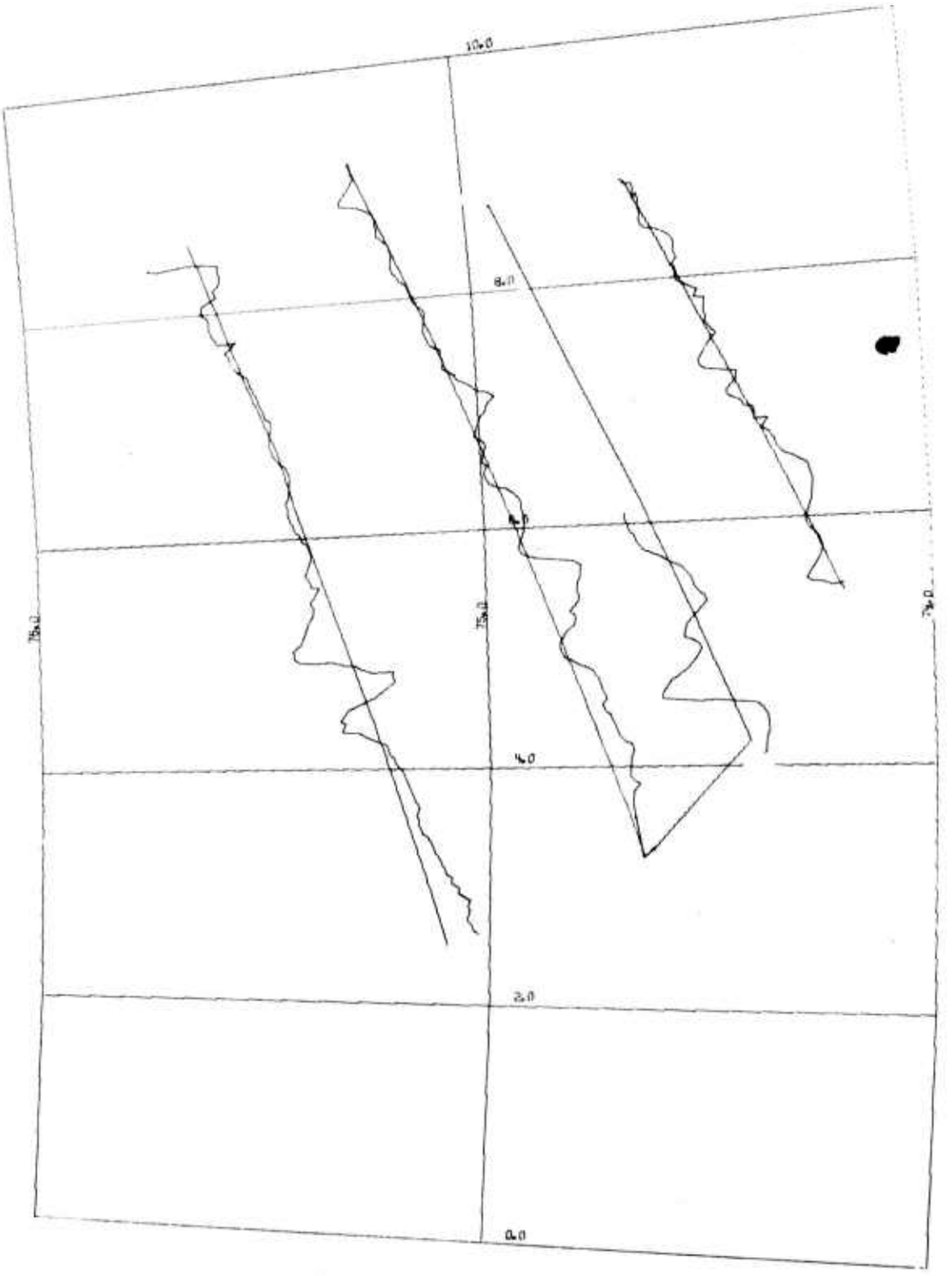
Number	Card Title	Column Number	Description
		5-12	02251600 The date and time of the first data point to be plotted from the second input tape. The dates for the first input tape are on the Map Parameter card.
		13-20	02280830 Date and time of the last data point to be read and plotted from the second input tape.
16	Plot Values	1-11	PLOT VALUES This command causes the named series to be plotted.
17	Special Anom1	1-13	SPECIAL ANOM1 This command allows the user to plot the profiling series. Use only if there is a 1 in Column 4 of Card No. 11.
18	Plot Anom1	1-10	PLOT ANOM1 This command causes the profiling series to be plotted. Use only if there is a 1 in Column 4 of Card No. 11.
19	Continue		This card is used only if another plot is desired. It should be followed by a set of control cards (cards 10 through 18). The program will not rewind the input tapes. It will continue reading where it left off unless told to skip to another file by the Map Parameter card.
20	Stop		STOP This command terminates the program.
21	End of File		Terminates the run.

APPENDIX C
Sample Profiles

BATHYMETRY PROFILE



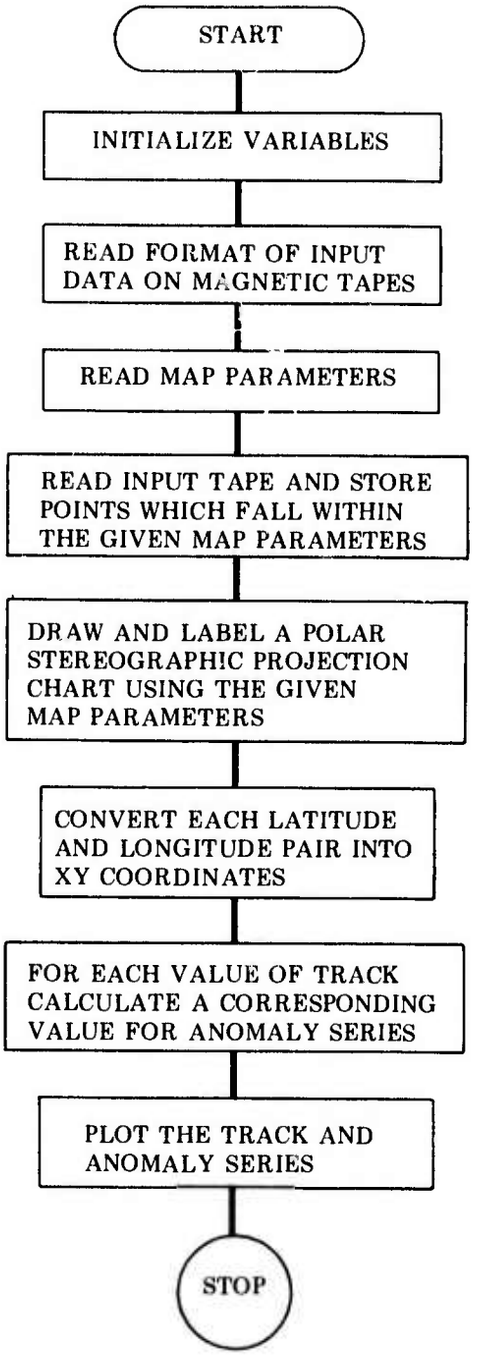
MAGNETIC PROFILE



APPENDIX D
Sample Output Listing

```
DATA FORMAT  ...(13X,I2,I4,1X12,F3.1,F8.4,F9.4,10XF5.1,23X)

CHART PARAMETERS
SOUTHMOST LATITUDE        74.0          NORTHMOST LATITUDE      76.0
WESTMOST LONGITUDE         0.0          EASTMOST LONGITUDE      10.0

PROGRAM READ IN     1279  POINTS

PROGRAM PLOTTED     1278  POINTS ON THE MAP

PROGRAM READ IN     1279  POINTS

PROGRAM PLOTTED      975  POINTS ON THE MAP
```

APPENDIX E
Flow Chart



APPENDIX F
Source Language Listing

```
      PROGRAM TRACK
      DIMENSION IBLF(254)
      DIMENSION NAME(6)          ,IFM(20)
      REAL LATMIN,LATMAX,LONGMIN,LONGMAX ,LAT
      COMMON DELAT,DELON,XPOLAT,XPOLON
      COMMON LX
      COMMON W,DIST,ANOMCK,CHANGE,NP,LKK,KNUM,INUM,GINCH
      COMMON ANOM(    2),III,JJJ,KKK,XLAST
      COMMON LAT(2)
      COMMON INP,IO,U,V,XLAT,XLON
      COMMON POLAT,POLONG,ROT,LMIN,LMAX,VMIN,VMAX,HEIGHT,NLAT,NLON,
     *IPROJ,IBOX,SCALE,ISYMB,ILINE
      COMMON NALL,ISTART(11),NAMES(10,6),LENG,LAST
      COMMON YES,TITLE(10),ICOL,IA(76)
      COMMON/1/IDATE(2) ,HEDN(2)
      COMMON/3/LATMIN,LATMAX
      COMMON/5/JUDY1,JUDY2,ITM1,ITM2
      COMMON/7/LONGMIN,LONGMAX
      COMMON/8/IFM
      COMMON/10/IEXTRA,ISKIP
      DATA(KEY1=4HCENT),(KEY2=4HREAD),(KEY3=4HCOMP),(KEY4=4HSPEC),(KEY5=
     13HMAP),(KEY6=4HTITL),(KEY7=4HLAND),(KEY8=4HPLOT),(KEY9=4HPRIN),(KE
     2Y10=4HSTOP),(KEY11=4HERAS),(KEY12=4HSTOR),(KEY13=4HRECA),(KEY14=4H
     30THE),(KEY15=4HPOLE),(KEY16=4HTURN),(KEY17=4HFPLO)
      REWIND 15
 6601 REWIND 20
      KNUM=0
      INUM=0
      JJJ=0
      NALL=0
      LAST=0
      REWIND 05
      REWIND 06
      INP=60
      IO=61
      ISTART(1)=1
      YES=-100.0
      ICOL=100
C KKK IS A INDICATOR IF=0 WILL ONLY READ TRACK SERIES FROM CALCM
C  IF=1 WILL CALCULATE ANOMALY SERIES AS WELL
      KKK=1
      DIST=10,
      ANOMCK=1500,
      CHANGE=20,
      CALL PLOTS(IBLF,254,40,29)
      READ (INP,1000) IFM
      WRITE(IO,1001) IFM
1000  FORMAT(20A4)
 1001  FORMAT(///* DATA FORMAT .;.*,20A4)
      SCALE=0,
      WIDTH=HEIGHT
C  ISYMB FOR NAVIGATION DATA / LINE AND NOT ANNOT   1 SYMBOL AND ANNOT
      READ(60,900)IBOX,KKK,ISYMB,ILINE,NLAT,NLON,ISKIP,GINCH,HEIGHT,
     1LATMIN,LATMAX,LONGMIN,LONGMAX,IEXTRA,JUDY1,ITM1,JUDY2,ITM2
 900  FORMAT(7I2,6F8.2,    I2,4I4)
      DO 701 IX=1,ISKIP
```

```
 701  CALL SKIPFILE(15)
      DIST=10.0
      CHANGE=20.0
      ANOMCK=1500.0
      ILINE=1
 700  IPROJ=7
      POLONG=0.0
      POLAT=90.0
      F=.0174533
      SKALE=COS(LATMIN*F)
      DELON=LONGMAX-LONGMIN
      DELAT=LATMAX-LATMIN
      XLON=0
      XLAT=LATMAX
      CALL CONV(XLAT)
      VMAX=V
      XLAT=LATMIN
      CALL CONV(XLAT)
      VMIN=V
      UMAX=(3.1415926536/360.)*DELON*SKALE
      UMIN=-UMAX
 910  WRITE(10,1003)
 1003 FORMAT(1HO,16HCHART PARAMETERS)
      WRITE(10,1004)LATMIN,LATMAX
 1004 FORMAT(1H ,20HSOUTHMOST LATITUDE  ,F10.1,10X,20HNORTHMOST LATITUDE
     1  ,F10.1)
      WRITE(10,1005) LONGMIN,LONGMAX
 1005 FORMAT(1H ,20HWESTMOST LONGITUDE  ,F10.1,10X,20HEASTMOST LONGITUDE
     1  ,F10.1)
 10   CALL NEXT(KEY,NAME)
      IF(KEY.EQ,KEY1) GO TO 6600
      IF(KEY.EQ,KEY4) GO TO 1055
      IF(KEY.EQ,KEY6) GO TO 600
      IF(KEY.EQ,KEY8) CALL OUTPUT(NAME,1)
      IF (KEY .EQ, KEY10) GO TO 100
      GO TO 10
 1055 CALL OTHER(LAT(1),LAT(LAST+1))
      LAST=LAST + NP
      IF(LKK.EQ,2) GO TO 10
      WRITE(10,1050) NP
 1050 FORMAT(16HOPROGRAM READ IN,I9,2X6HPOINTS)
      GO TO 10
 600  READ(INP,8000) TITLE
 8000 FORMAT(10A8)
      WRITE(10,6000) TITLE
 6000 FORMAT(1HO,12HMAP TITLE   ,10A8)
      YES=100.0
      GO TO 10
 6600 CALL PLOT(WIDTH +10.0,0,0,0,83)
      GO TO 6601
 100  CALL PLOTS(0,0)
      CALL STOPPLOT
      END
```

```
                                        IDENT     TRACK
PROGRAM LENGTH                  01166
ENTRY POINTS     TRACK          00541
BLOCK NAMES
                                00315
                 1              00004
                 3              00002
                 5              00004
                 7              00002
                 8              00024
                 10             00002
EXTERNAL SYMBOLS
                 Q8QENTRY
                 THEND,
                 Q8QDICT,
                 PLOTS
                 SKIPFILE
                 CONV
                 NEXT
                 OUTPUT
                 OTHER
                 PLOT
                 STOPPLOT
                 COSF
                 REW,
                 TSH,
                 STH,
                 SL0,
                 SLI,
                 QNSINGL.
  00233 SYMBOLS
```

```
      SUBROUTINE CONV(LAT,IPEN,IPROJ)
C
CCC BASIC SUBROUTINE CONTAINING 12 STANDARD  PROJECTIONS.
C
      REAL LAT
      DIMENSION HEAD(2)
      DIMENSION S(2),P(2)
      DIMENSION LAT(2)
      DIMENSION A(4)
      COMMON DELAT,DELON,XPOLAT,XPOLON
      COMMON LX
      COMMON W,DIST,ANOMCK,CHANGE,NP,LKK,KNUM,INUM,GINCH
      COMMON ANOM(    2),IIII,JJJ,KKK,XLAST
      COMMON X(2)
      COMMON INP,I0,U(2),XLAT,XLON
      COMMON POLAT,PHI0,ROT,LV(4),HEIGHT,NLAT,NLON,III(2),SCALE,ISYMB
     1,ILINE
      COMMON NALL,ISTART(11),NAMES(10,6),LENG,LAST
      COMMON YES,TITLE(10),ICOL,IA(76)
      COMMON/1/IDATE(2) ,HEDA(2)
      COMMON/9/UDIFF,DIFF,LUIN,VVIN
      DATA(RATIO=1.00092),(ECCSQ=0.0067227)
      DATA(F=.0174533),(LLAST=9999,)
      DATA((A(I),I=1,4)=1.37027,-.28771,.080412,-.14842)
      DATA(EE=1.7182818)
```

```
      RCF=57.2957795
      IDAY=0.0
      IPKN=0
      ZERO=0.0
      ZNINE=99.0
      PI=3.14159
C     UV(4)=VMAX(UV(3)=VMIN
      SCAL=HEIGHT/(UV(4)-UV(3))
C
C  GENERAL ENTRY POINT FOR ALL AZIMUTHAL PROJECTIONS.
C
1     SINPH=SIN(F*(LAT(2)-PHI0))
      COSPH=COS(F*(LAT(2)-PHI0))
      SINRT=-COS(F*ROT)
      COSRT= SIN(F*ROT)
      SINL0= SIN(F*POLAT)
      COSL0 =COS(F*POLAT)
      SINLA=SIN(F*LAT(1))
      COSLA=SQRT(1.-SINLA*SINLA)
      COSA=SINLA*SINL0+COSLA*COSL0*COSPH
      SINA=SQRT(1.00001-COSA*COSA)
      SINB=COSLA*SINPH/SINA
      COSB=(SINLA*COSL0-COSLA*SINL0*COSPH)/SINA
C
C  STEREOGRAPHIC WITH ORIGIN AT POLAT,POLONG
C
70    R=2.0*SINA/(1.000001+COSA)
101   U(1)= R*(COSB*COSRT-SINB*SINRT)
      U(2)=-R*(SINB*COSRT+COSB*SINRT)
C    THIS SECTION CALCULATES SERIES ANOM
C     I COULD HAVE BEEN REPLACED WITH III BUT IT WAS NOT WORTH THE EFFORT
C     JJJ IS A COUNTER, IT IS IN COMMON BECAUSE IT NEEDS TO BE INCREMENTED
C     EACH TIME IT SWITCHES FROM *OUTPUT* TO *CONV*
C     THE VALUE OF III IS SET IN *OTHER* IT IS THE NEXT UNUSED POSITION
C     IN ARRAY X(12000) WHICH WILL START SERIES ANOM.
      IF(LKK .NE.1)GO TO 10
      P(1)=U(1)
      P(2)=U(2)
      JJJ=JJJ + 1

      K=JJJ
      J=K-1
      IF(J)800,800,31
31    ANOM(1)=ANOM(2)
      HEDN(1)=HEDN(2)
      READ(06,33)ANOM(2),HEDN(2),IPPN
33    FORMAT(2F10.4,I2)
800   I=III
      IF(K.EQ.1) 501,602
501   S(1)=P(1)
      S(2)=P(2)
      GO TO 20
602   IF(IPEN.EQ.3) 603,502
603   IPPN=5
      GO TO 205
502   IF(K.EQ.2) 503,604
503   XDIFF=P(1)-S(1)
      YDIFF=P(2)-S(2)
      GO TO 17
604   IF(IPPN.EQ.3) 503,504
```

```
  504  XDIFF=(XDIFF*1+(P(1)-S(1)))/(1+1)
       YDIFF=(YDIFF*1+(P(2)-S(2)))/(1+1)
   17  GO TO 15
   15 HEAD(2)=ATAN2(YDIFF,XDIFF)
       IF(HEAD(2).LT.0.)HEAD(2)=2*PI+HEAD(2)
C  HEAD(2) IS AN ANGLE BETWEEN 0 AND 2*PI
   19  IF(0..LE.HEAD(2))411,408
  411  IF(HEAD(2).LE.PI/2)407,408
  407  ISIGN=1
       GO TO 23
  408  IF(3.*PI/2..LT.HEAD(2))412,410
  412  IF(HEAD(2).LT.2.*PI)409,410
  409  ISIGN=1
       GO TO 23
  410  ISIGN=-1
   23  XONE=S(1)-ISIGN*AMOM(2)*SIN(HEAD(2))/(OINCH*SCAL)
       XTWO  =S(2)+ISIGN*AMOM(2)*COS(HEAD(2))/(OINCH*SCAL)
  205  WRITE(05,700) XONE,XTWO,IPPA,IDAY
  700  FORMAT(2F10.4,2I10)
       XLAST=XONE
       IWRIT=I+1
       S(1)=P(1)
       S(2)=P(2)
       HEAD(1)=HEAD(2)
   16  I=I+2
   20  IIII=I
   18  RETURN

       END
```

```
    CONV

                                    IDENT     CONV
PROGRAM LENGTH              00515
ENTRY POINTS     CONV       00032
BLOCK NAMES
                            00315
                 1          00004
                 9          00004
EXTERNAL SYMBOLS
                 Q1C10100
                 THEND,
                 Q1C04100
                 QBCDICT,
                 ATAN2
                 SQRTF
                 SINF
                 COSF
                 TSW,
                 STW,
                 ONSINGL,
  00234 SYMBOLS
```

```
      SUBROUTINE OUTPUT (NAME,IGO)
C
      REAL LAT
      INTEGER TITLE
      DIMENSION RADIUS(2)
      REAL LATMIN,LATMAX,LONGMIN,LONGMAX
      REAL LATNOT(90),LONNOT(180)
      COMMON DELAT,DELON,XPOLAT,XPOLON
      COMMON LX
      COMMON W,DIST,ANOMCK,CHANGE,NP,LKK,KNUM,INUM,GINCH
      COMMON ANOM(    2),III,JJJ,KKK,XLAST
      COMMON LAT(2)
      COMMON INP,IO,U,V,XLAT,XLON
      COMMON POLAT,POLONG,ROT,UMIN,UMAX,VMIN,VMAX,HEIGHT,NLAT,NLON,
     *IPROJ,IBOX,SCALE,ISYMB,ILINE
      COMMON NALL,ISTART(11),NAMES(10,6),LENG,LAST
      COMMON YES,TITLE(10),ICOL,IA(76)
      COMMON/1/IDATE(2) ,HEDN(2)
      COMMON/3/LATMIN,LATMAX
      COMMON/7/LONGMIN,LONGMAX
      COMMON/9/UDIFF,DIFF,LUIN,VVIN
      DATA(F=,0174533)
      DATA(SIN1=,0174524),(COS1=,999848)
      DATA(ENDLAT=99,0),(IPEN=0)
C
      IF(LKK.EQ,2) GO TO 502
      LTEMP=LKK
      LKK=0
      ONGMIN=LONGMIN
       ONGMAX=LONGMAX
      IF(LONGMIN,LT,0) ONGMIN=LONGMIN + 360
      IF(LONGMAX,LT,0) ONGMAX=LONGMAX + 360
      IPEN=3
      TESTMIN=LONGMIN
      TESTMAX=LONGMAX
      ITMIN=ABS(TESTMIN)
      ITMAX=ABS(TESTMAX)
C  TEST IF COMPLETE CIRCLE
      IF(ITMIN.EQ,0,AND.ITMAX.EQ,360) GO TO 3000
C  TEST IF HOVERS AROUND 0 OR 180
      IF(TESTMIN,GT,0,AND,TESTMAX,LT,0)GO TO 2001
      IF(TESTMIN,LT,0,AND,TESTMAX,GT,0) GO TO 2000
      IF(ABS(LONGMAX),GT,ABS(LONGMIN))GO TO 8500
C  LEFT HALF OF SPHERE
      IF(ABS(LONGMIN),LE,90,OR,ABS(LONGMIN),GT,90,AND,ABS(LONGMAX),LT,
     190)GO TO 2005
      XLAT=LATMAX
      XLON= ONGMAX
      CALL CONV(XLAT)
      DIFF=V-VMIN
      XLAT=LATMIN
      XLON=ONGMAX
      CALL CONV(XLAT)
      UDIFF=U-UMIN
      GO TO 8501
2005  XLAT=LATMIN
      XLON= ONGMAX
      CALL CONV(XLAT)
      DIFF=V-VMIN
      XLAT=LATMIN
      XLON=ONGMIN
      CALL CONV(XLAT)
      UDIFF=U-UMIN
       GO TO 8501
```

```
C  COMPLETE CIRCLE
 3000 DIFF=0
      XLAT=LATMIN
      XL0N=270.0
      CALL C0NV(XLAT)
      UDIFF=U-UMIN
      GE T0 8501
C  H0VERS AR0UND 180
 2001 IF(ITMIN.GT,ITMAX) GE T0 2002
      XLAT=LATMAX
      XL0N=0NGMIN
      CALL C0NV(XLAT)
      DIFF=V-VMIN
      XLAT=LATMIN
      XL0N=0NGMAX
      CALL C0NV(XLAT)
      UDIFF=U-UMIN
      NLTEST=2
      G0 T0 8501
C  H0VERS AR0UND 0
 2000 DIFF=0
      XLAT=LATMIN
      XL0N=L0NGMIN
      CALL C0NV(XLAT)
      UDIFF=U-UMIN
      NLTEST=1
      GE T0 8501
 2002 XLAT=LATMAX
      XL0N=0NGMAX
      CALL C0NV(XLAT)
      DIFF=V-VMIN
      XLAT=LATMIN
      XL0N=0NGMAX
      CALL C0NV(XLAT)
      UDIFF=U-UMIN
      NLTEST=2
      GE T0 8501
C  RIGHT HALF 0F SPHERE
 8500 IF(ABS(L0NGMIN),LE.90,ER.ABS(L0NGMIN),LT.90,AND,ABS(L0NGMAX).GT.90) G0 T0
     1)G0 T0 2004
      XLAT=LATMAX
       XL0N=0NGMIN
       CALL C0NV(XLAT)
      DIFF=V-VMIN
      XLAT=LATMAX
      XL0N=0NGMAX
      CALL C0NV(XLAT)
      UDIFF=U-UMIN
      GE T0 8501
 2004 XLAT=LATMIN
      XL0N=0NGMIN
      CALL C0NV(XLAT)
      DIFF=V-VMIN
      XLAT=LATMAX
      XL0N=0NGMIN
      CALL C0NV(XLAT)
      UDIFF=U-UMIN
      GE T0 8501
 8501 VVIN=VMIN
      VVAX=VMAX
      ULIN=UMIN
      ULAX=UMAX
      ICOUNT=0
      LKK=LTEMP
```

```
      ICHECK=0
      KOUNT=0
      LML=1
      FIRST=0
  100 CONTINUE
C
C  IF *IPEN* IS 0 THIS IS THE FIRST MAP AND THE ORIGIN IS NOT SHIFTED.
101   IF (IPEN) 102,103,102
  102 CALL PLOT(WIDTH+1.0,0.0,-3)
C
103   WIDTH=HEIGHT*(UMAX-UMIN)/(VMAX-VMIN)
      CALL PLOT(0.0 ,-3)
      IF(YES.EQ.100.0)CALL SYMBOL(     *1.0,,2,.21,TITLE,90.0,80)
      YES=+1.0
C  CERTAIN TRIG FUNCTION THAT ARE CONSTANT FOR A GIVEN MAP ARE CALCULATED AND
C  STORED IN *CONV* - *NEWMAP* IS AN ENTRY TO THAT ROUTINE
C
      SCALE=HEIGHT/(VMAX-VMIN)
      DIFF=DIFF*SCALE
      UDIFF=UDIFF*SCALE
      LTEMP=LKK
      LKK=0
C  DRAW LONGITUDE LINES
      DEG=FLOAT(NLON)
      IPEN=3
      XLAT=-90.0
      PLONG=ONGMIN
      IF(PLONG.LT.0.)PLONG=PLONG+360.
      XLON=PLONG-DEG
      DLAT=-.5
      ZZMAX=DELAT/2.0
      ZTOP=POLAT + ZZMAX
      DO 110 I=1,360,NLON
      XLON=XLON+DEG
      IF(XLON.GT.360.)XLEN=XLON-360.
      DLAT=-DLAT
      DO 110 J=1,361
      XLAT=XLAT+DLAT
      CALL CONV(XLAT)
      V=((U-UMIN)*SCALE)-UDIFF
      W=((V-VMIN)*SCALE)-DIFF
  555 FORMAT(1HO,8F10.5)
      IF(NOTEST.EQ.1) GO  767
      IF(XLON.LT. ONGMIN.OR.XLEN.GT. ONGMAX.OR.XLAT.LT.LATMIN.OR.XLAT.
     1GT.LATMAX) GO TO 120
      GO TO 778
  767 IF(XLON.GT.ONGMAX.AND.XLEN.LT.ONGMIN.OR.XLAT.LT.LATMIN.OR.XLAT.GT.
     1LATMAX) GO TO 120
  778 IF(XLAT-ZTOP*.4)7000,120,7000
 7000 CALL PLOT (V,W,IPEN)
      IPEN=2
      GO TO 110
  120 IPEN=3
  110 CONTINUE
      DEG=FLOAT(NLAT)
  150 XLAT=LATMIN-DEG
      IG2=2*NLAT
C
      DO 159 I=IG2,361,NLAT
      XLAT=XLAT+DEG
      IF(XLAT.GT.LATMAX + 1) GO TO 888
      IF(XLAT.GE.90.)900,901
```

```
  900  XLAT=LATMIN-DEG
       DEG=-DEG
  901  DLON=1.0
       IPEN=3
       XLON=-DLON
  155  XLON=XLON+DLON
       CALL CONV(XLAT)
       W=((V-VMIN)*SCALE)-DIFF
       Y=((U-UMIN)*SCALE)-UDIFF
       IF(NUTEST.EQ.1) GO TO 779
  556  IF(XLON.LT. ONGMIN.OR.XLONIGT. ONGMAX.OR.XLAT.LT.LATMIN.OR.XLAT.
      1GT.LATMAX) GO TO 158
       GO TO 780
  779  IF(XLON.GT.ONGMAX.AND.XLONILT.ONGMIN.OR.XLAT.LT.LATMIN.OR.XLAT.GT.
      1LATMAX) GO TO 158
  780  CALL   PLOT(Y,W,IPEN)
       IPEN = 2
  156  IF(XLON-360.0)155.159.159
  158  IPEN=3
       GO TO 156
  159  CONTINUE
C
C  LABEL LATITUDE LINES
  888  ISTOP=LONGMAX - LONGMIN + 1
       ITOP = DELAT * 2 + 1
       IPEN = 3
       DEG=FLOAT(NLAT)
       IF(NUTEST.EQ.1) GO TO 775
       XPOLON= ONGMAX-( ONGMAX- ONGMIN)/2
       GO TO 774
  775  XPOLON=LONGMAX-(LONGMAX-LONGMIN)/2
  774  XPOLAT=LATMIN - DEG
       DO 171 I=1,ITOP
       XPOLAT=XPOLAT + DEG
       IF(XPOLAT.GT.LATMAX) GO TO 999
       CALL CONV(XPOLAT)
       Y=((U-UMIN)*SCALE)-UDIFF
       W=((V-VMIN)*SCALE)-DIFF
       CALL PLOT(Y+.05,W+.05,3)
       CALL NUMBER(Y+.05,W+.05,.07,XPOLAT,0.0,4HF6.1)
  171 CONTINUE
C  LABEL LONGITUDE LINES
  999  DEG=FLOAT(NLON)
       XPOLAT=LATMIN + DELAT/2
       XPOLON=LONGMIN - DEG
  805  XPOLON=XPOLON + DEG
       A=270. + XPOLEN
       IF(A.GT.360) A=A-360
       IF(NUTEST.EQ.2) GO TO 8503
       IF(XPOLON.GT.LONGMAX) GO TO 998
       GO TO 8504
 8503  IF(XPOLON.GT.ONGMAX) GO TO 998
 8504  CALL CONV(XPOLAT)
       W=((V-VMIN)*SCALE)-DIFF
       Y=((U-UMIN)*SCALE)-UDIFF
       CALL PLOT(Y+.05,W+.05,3)
       CALL NUMBER(Y+.05,W-.05,.07,XPOLON,A,4HF6.1)
       GO TO 805
  998  LKK=LTEMP
C
C  PLOTTED OUTPUT SECTION.
```

```
C
      REWIND 20
 302  II=1
      IEND=LAST +2
      IFIN=IEND - 4
      JJJ=0
      IPEN=3
      INMAP=0
C   THE VALUE OF LKK IS SET IN SUB OTHER DEPENDING ON THE VALUE OF KKK
      IF(LKK.EQ.2)GO TO 303
      GO TO 301
 309  W=((LAT(2)-VMIN)*SCALE)-DIFF
      Y=((LAT(1)-UMIN)*SCALE)-UDIFF
      GO TO 310
C
C  CHECK FOR BEGINNING OF NEW SERIES OR CHANGE TO POINT MODE
 301  READ(20,6000)LAT(1),LAT(2),IPEN     ,IDATE(2)
 6000 FORMAT(2F10.4,2I10)
      IF(LAT(1)-ENDLAT)302,328,328
C
C  CONTINUOUS MODE DATA DRAWN
302   CALL CONV(LAT( 1),IPEN,IPREV)
      GO TO 304
 303  READ(05,6000) LAT(1),LAT(2),IPEN     ,IDATE(2)
      IF(EOF,05)390,777
 777  IF(LAT(1)-ENDLAT)309,329,309
  329 INMAP=INMAP+1
      IPEN=3
      II=II+2
 331  IF(II-IFIN)303,390,390
  304 CONTINUE
      W=((V-VMIN)*SCALE)-DIFF
      Y=((U-UMIN)*SCALE)-UDIFF
C
C  CHECKS IF POINT LIES INSIDE MAP RECTANGLE, IF NOT SKIPS PLOT ROUTINE AND
C  COUNTING STATEMENT
 310  IF(IPEN,EQ,5) GO TO 210
 9067 CALL PLOT(Y,W,IPEN)
  210 CONTINUE
      INMAP=INMAP+1
      IPEN=2
320   II=II+2
      IF(LKK.EQ.2)GO TO 331
      IF (II-IEND) 301,390,390
328   INMAP=INMAP+1
330   IPEN=3
      GO TO 320
 390  IMAP=INMAP - 1
      IF(LKK.EQ.2) GO TO 604
      WRITE(10,3000) IMAP
 3000 FORMAT(16HOPROGRAM PLOTTED,I9,2X17HPOINTS ON THE MAP)
C    IF LKK=0 SUB OTHER WILL NOT CALCULATE ANOMALY SERIES ( IF=2 ANOMALY SERIES
C     HAS JUST BEEN PLOTTED THEREFOR REINITIALIZE EVERYTHING
      IF(LKK.EQ.0,OR,LKK.EQ.2)604,399
 604  KNUM=0
      INUM=0
      JJJ=0
      NALL=0
      LAST=0
  399 CONTINUE
```

```
C  PROGRAM PLOTTED TRACK  READY TO PLOT ANOMALY
      REWIND 05
 900  RETURN
C
C  PRINTED OUTPUT SECTION
C
      END
```

```
                                    IDENT     OUTPUT
PROGRAM LENGTH                 02161
ENTRY POINTS     OUTPUT        00456
BLOCK NAMES
                               00315
                 1             00004
                 3             00002
                 7             00002
                 9             00004
EXTERNAL SYMBOLS
                 Q1C10100
                 THEND.
                 Q8QDICT.
                 CONV
                 PLOT
                 SYMBOL
                 NUMBER
                 Q8QIFEOF
                 REW.
                 TSH.
                 STH.
                 ONSINGL.
   00425 SYMBOLS
```

```
      SUBROUTINE NEXT(INSTR,NAME)
C
C  THIS PROGRAM ATTEMPTS TO PROVIDE A MACHINE-INDEPENDENT ROUTINE FOR READING
C  CONTROL CARDS IN SUPERMAP. THE WORD LENGTH OF THE MACHINE IS REQUIRED TO BE
C  AT LEAST FOUR BCD CHARACTERS LONG, THIS IS MET BY ALL MACHINES LIKELY TO BE
C  ENCOUNTERED.
C
      DIMENSION NAME(6)
      COMMON DELAT,DELON,XPOLAT,XPOLON
      COMMON LX
      COMMON W,DIST,ANOMCK,CHANGE,NP,LKK,KNUM,INUM,GINCH
      COMMON ANOM(    2),III,JJJ,KKK,XLAST
      COMMON X(2)
      COMMON INP,IO,U,V,XLAT,XLON
      COMMON POLAT,POLONG,ROT,LMIN,LMAX,VMIN,VMAX,HEIGHT,NLAT,NLON,
     *IPROJ,IBOX,SCALE,ISYMB,ILINE
      COMMON NALL,ISTART(11),NAMES(10,6),LENG,LAST
      COMMON YES,TITLE(10),ICOL,IA(76)
      COMMON/1/IDATE(2) ,HEDN(2)
      DATA(IBLANK=1H ),(ICOMMA=1H,),(NULL=1)
10    DO 11 IWORD=1,6
11    NAME(IWORD)=IBLANK
      IWORD=1
15    IF (IWORD.GT.1) RETURN
20    ICOL=ICOL+1
      IF (ICOL.GT.76) GO TO 30
25    IAC=IA(ICOL)
      IF (IAC.EQ.IBLANK .OR. IAC.EQ.ICOMMA) GO TO 15
      IF (IWORD.LE.6) NAME(IWORD)=IA(ICOL)
      IWORD=IWORD+1
      NULL=1
      GO TO 20
30    IF (NULL.EQ.0) GO TO 35
      IF (IWORD.GT.1) RETURN
      READ (INP,1000) INSTR,IA
1000  FORMAT(A4,76A1)
      NULL=0
      NAME(1)=IBLANK
      DO 33 KCOL=1,76
C  KCOL IS USED BECAUSE THE COMPILER SEEMS UNABLE TO ACCEPT THE DO LOOP BELOW IF
C  ICOL IS USED THROUGHOUT.
      ICOL=KCOL
      IF (IA(KCOL).EQ.IBLANK.OR. IA(KCOL).EQ.ICOMMA) GO TO 10
33    CONTINUE
35    NULL=1
      RETURN
      END
```

```
                                IDENT     NEXT
PROGRAM LENGTH                  00200
ENTRY POINTS    NEXT            00012
BLOCK NAMES
                                00315
                1               00004
EXTERNAL SYMBOLS
                THEND,
                QBCDICT,
                TSH,
                SLI,
                QNSINGL,
  00156 SYMBOLS
```

```
      SUBROUTINE OTHER(XOLD,XNEW)
      REAL LATMIN,LATMAX,LONGMIN,LONGMAX
      DIMENSION IIYR(20),IIDAY(20),IIHR(20),DDMIN(20),RRLAT(20),RRLONG(
     120),AANOMAL(20)
      DIMENSION IFM(20),KPEN(2)
      COMMON DELAT,DELON,XPOLAT,XPOLON
      COMMON LX
      COMMON W,DIST,ANOMCK,CHANGE,N1,LKK,KNUM,INUM,GINCH
      COMMON ANOM(    2),III,JJJ,KKK,XLAST
      COMMON X(2)
      COMMON INP,IC,U,V,XLAT,XLON
      COMMON POLAT,POLONG,ROT,LMIN,LMAX,VMIN,VMAX,HEIGHT,NLAT,NLON,
     *IPROJ,IBOX,SCALE,ISYMB,ILINE
      COMMON NALL,ISTART(11),NAMES(10,6),LENG,LAST
      COMMON YES,TITLE(10),ICOL,IA(76)
      COMMON/1/IDATE(2) ,HEDN(2)
      COMMON/3/LATMIN,LATMAX
      COMMON/5/JUDY1,JUDY2,ITM1,ITM2
      COMMON/7/LONGMIN,LONGMAX
      COMMON/8/IFM
      COMMON/10/IEXTRA,ISKIP
      IT=15
      IEX=0
      ATMIN=LATMIN
      ATMAX=LATMAX
      IF(ISYMB.EQ.1) ATMIN=ATMIN + 1
      DIST2=80.
      HEDNL=279.
      IFLIGHT=1
      IMP=60
      IAY1=3
      IDAY=0
      ZNINE=99.0
      ZERO=0.0
      DEGRA=1.745329E-2
      CHANGE1=450.+(360.-CHANGE/2.)
      CHANGE2=(450.0-CHANGE/2.)-360.
      M=1
      L=1
      IF(LKK.EQ.1)GO TO 50
      I=1
900   IF(I.EQ.1)200,201
200   WRITE(20,701)ZNINE,ZERO,IDAY,IDAY
800   FORMAT(1H0,I10, 2F10.4)
      M=M+2
      N=21
201   IF(N-20) 801,801,977
977   N=1
800   READ(IT,IFM)IIYR(N),IIDAY(N),IIHR(N),DDMIN(N),RRLAT(N),RRLONG(N),
     1AANOMAL(N)
      IF(IOCHECK,IT) 800,779
779   IF(EOF,IT) 777,778
777   IEND=IEND + 1
      IF(IEND . GE. 1) GO TO 401
778   N=N + 1
      IF(N.LT.21) GO TO 800
```

```
      N=1
801   IYR=IIYR(N)
      IDAY=IIDAY(N)
      IHR=IIHR(N)
      DMIN=DDMIN(N)
      JMIN=DMIN
      IMIN=IHR*100 + JMIN
      RLAT=RRLAT(N)
      RLONG=RRLONG(N)
      ANOMAL=AANOMAL(N)
      IF(IBOX)351,355,350
351   ANOMAL=-ANOMAL
      GO TO 355
350   ANOMAL=-ANOMAL+1.8288
355   N=N+1
      IF(IDAY,LT,JUDY1)GO TO 201
      IF(RLAT,GT,90,0)GO TO 202
      IF(IDAY,GT,JUDY2) GO TO 811
      IF(IYR,EQ,0) GO TO 811
      IF(RLAT,LT, ATMIN) GO TO 202
      IF(RLAT,GT,LATMAX) GO TO 202
      IF(RLONG,LT,LONGMIN) GO TO 202
      IF(RLONG,GT,LONGMAX) GO TO 202
      IF(IDAY,EQ,JUDY1,AND,IMIN,LT,ITM1) GO TO 201
      IF(IDAY,EQ,JUDY2,AND,IMIN,GT,ITM2) GO TO 811
      IF(IHR,EQ,KHR,AND,,MIN,LT,KMIN) GO TO 202
401   IF(L-3)70,72,72
202   IAY1=3
      GO TO 201
811   IF(L-3)99,810,810
810   WRITE(06,71)ANOM(1),HEDN(1),KPPEN(1)
      GO TO 99
72    WRITE(06,71) ANOM(1),HEDN(1),KPPEN(1)
71    FORMAT(2F10,4,I2)
70    IF(IEND,EQ,1) GO TO 99
901   IF(L,EQ,1)GO TO 5
      HEDN(  1)=HEDNL
    5 CONTINUE
      ANOM(1)=ANOM(2)
      KPPEN(1)=KPPEN(2)
      KPPEN(2)=IAY1
      ANOM(2)=ANOMAL
      GO TO 19
   19 CONTINUE
      WRITE(20,701)RLAT,RLONG,IAY1,IAY1
701   FORMAT(2F10,4,2I10)
      KHR=IHR
      KMIN=JMIN
      IAY1=2
      IF(L,EQ,1)GO TO 60
      HEDN(  1)=450,-HEDN(  1)
      IF(HEDN(  1),GT,360.00)HEDN(  1)=HEDN(  1)-360.0
  910 HEDN(  1)=HEDN(  1)*DEGRA
   60 CONTINUE
      L=L+1
      M=M+2
```

```
      IF(I.GT.10)GO TO 20
   12 KK=I+1
   20 I=I+1
      GO TO 500
   99 WRITE(06,71)ANOM(2),HEDN(1),KPPEN(2)
      IEX=IEX + 1
      IF(IEXTRA.EQ.IEX) GO TO 667
      L=1
      IT=IT + 1
      READ(60,665)ISKIP,JUDY1,ITM1,JUDY2,ITM2
  665 FORMAT(514)
      DO 781 IX=1,ISKIP
  781 CALL SKIPFILE(IT)
      IAY1=3
      IEND = 0
      GO TO 977
  667 LENG=M-1
      REWIND 06
      III=M
      NI=I-1
      IF(KKK.EQ.0)206,207
  206 LKK=0
      RETURN
  207 LKK=1
      RETURN
C     THE VALUE OF III IS SET IN SUB CONV WHEN SERIES TRACK IS BEING PLOTTED
C  FOR EACH VALUE OF TRACK PLOTTED A CORRESPONDING VALUE OF SERIES ANOM
C IS FOUND (THE SERIES WILL BE AN X,Y VALUE IN INCHES STOREDIN COMMON X(1000)
C  WHEN SERIES ANOM IS PLOTTED SUBROUTINE CONVERT IS BYPASSED
C  SINCE THE SERIES ANOM IS ALREADY IN INCHES
C III IS ONE MORE THAN THE TOTAL LENTH OF ARRAYX(10000)
C     LENG IS THE LENGTH OF EACH SERIES CALCULATED IN *OTHER* WHICH IS STORED
C     IN X(10000) **NOT** THE LENGTH OF THE USED PORTION OF ARRAY X(10000)
   50 LENG=(III-3)/2*INUM
      LKK=2
      RETURN
      END
```

```
                                        ICENT      OTHER
      PROGRAM LENGTH                    01045
      ENTRY POINTS     OTHER            00242
      BLOCK NAMES
                                        00315
                       1                00004
                       3                00002
                       5                00004
                       7                00002
                       8                00024
                       10               00002
      EXTERNAL SYMBOLS
                       THEND,
                       Q1C10100
                       Q8CDICT,
                       SKIPFILE
                       Q8CIFEOF
                       Q8CIFI0C
                       REW,
                       TSM,
                       STM,
                       ONSINGL.
        00330 SYMBOLS
***BINARY DECK***
BANK,(0),/1/
LOAD
RUN,90,10000
```